CHO-THERM® 1678
Thermally Conductive Elastomer Insulators

MATERIAL DESCRIPTION & PRODUCT FORM OPTIONS

CHO-THERM 1678 material is a boron nitride-filled silicone elastomer which provides exceptionally good thermal performance at cost-effective prices.

CHO-THERM 1678 material is reinforced with fiberglass cloth to provide maximum resistance to tear, cut-through and punctures due to burrs and other mating surface irregularities. It is available in sheet form and die-cut configurations. The material is also available with an optional pressure-sensitive adhesive coating to facilitate assembly and production.

CHO-THERM 1678 insulators are recommended for use in all electronics systems and applications in which maximum heat transfer and reliability is required with moderate electrical isolation characteristics – such as computers, automotive electronics, power supplies, high power control electronics, etc. Because of its unique combination of conformability and resiliency, insulators fabricated from CHO-THERM 1678 material do not crack, tear or otherwise fail when torqued between mating metal surfaces – unlike ceramic insulator pads. Because they are greaseless, there are none of the problems associated with silicone migration, contamination or drying out.

CRITICAL PERFORMANCE CHARACTERISTICS

There are generally two objectives that must be satisfied in the interface between power semiconductor devices and their heat sinks.

1. To enhance the flow of heat from the device to the metal heat sink.
2. To electrically isolate the device from the metal heat sink.

CHO-THERM 1678 performs both functions simultaneously, effectively replacing the commonly used combinations of ceramic insulators or mica pads and silicone grease.

CONTACT PRESSURE & MOUNTING TORQUE

The optimum contact pressure range for CHO-THERM materials is 300-500 psi ($2.07 \times 10^6 – 3.45 \times 10^6 N/m^2$). Beyond this range, performance gains are negligible.

continued

	TYPICAL PROPERTIES	1678	TEST METHOD
CONSTRUCTION	Binder	Silicone	–
	Filler	Boron Nitride	–
	Carrier	Fiberglass	—
	Color	Pink	Visual
	Thickness, inch (mm)	0.010 (0.25)	ASTM D374
THERMAL	Thermal Impedance °C-in²/W (°C-cm²/W)	0.20 (1.29)	ASTM D5470
	Thermal Conductivity, W/m-K	2.0	ASTM D5470
	Operating Temperature Range, °C	–60 to +200	—
ELEC.	Voltage Breakdown, Vac	2500	ASTM D149
	Volume Resistivity, ohm-cm	1×10^{14}	ASTM D257
MECHANICAL	Tensile Strength, psi (MPa)	1000 (6.89)	ASTM D412
	Tear Strength, lb/in (kN/m)	100 (17.5)	ASTM D624
	Elongation, %	10	ASTM D412
	Hardness (Shore A)	90	ASTM D2240
	Specific Gravity	1.60	ASTM D792
	UL Recognized	File No. E57104	QMFZ2
	Outgassing: % TML % CVCM	0.55 0.12	ASTM E595

TML= Total Mass Loss
CVCM= Collected Volatile Condensible Materials.

Note: Pressure-sensitive adhesive may increase thermal impedance by as much as 0.05°C-in²/W (0.32°C-cm²/W). Contact Chomerics for further information

To convert mounting torque into contact pressure use the following equation:

$$P = \frac{(T)\ (N)}{(02)\ (D)\ (A)}$$

P = Contact Pressure (psi or N/m²)
T = Torque (in-lbs or N-m)
N = Number of Fasteners
(0.2) = Average Friction Factor
D = Diameter (in. or m)
A = Contact Area (in² or m²)

IMPROVEMENT IN THERMAL IMPEDANCE WITH TIME

The thermal impedance characteristics of CHO-THERM materials can be expected to improve during use due to stress relaxation of the elastomer and consequent additional filling of the microscopic voids in the interface surfaces. Improvement can be as much as 10-15% after the first few weeks of use.

THERMAL INTERFACE IMPEDANCE

The thermal performance of interface materials is generally characterized by the thermal impedance across the interface in °C-in²/watt.

The lower the value of thermal interface impedance, the better the thermal performance.

The thermal impedance of an interface depends greatly on a number of different parameters, including the flatness and smoothness of the mating surfaces forming the interface and the contact pressure between them, as well as the thickness of the interface material, its thermal conductivity and conformability.

VOLTAGE BREAKDOWN CHARACTERISTICS

When using thermal interface pads to electrically isolate a component from a metal heat sink or chassis, the critical material property for the pad is its dielectric strength. Dielectric strength is a measure of how well a material can prevent the voltage on the component case from arcing through the material and allowing an electrical short circuit between the component and the metal mounting surface. This property is commonly presented as the voltage breakdown shown in the Typical Properties Table, and is determined by electrical testing of multiple flat sheet samples in accordance with the test procedures detailed in ASTM D149. The higher the value of voltage breakdown, the better the material is at withstanding applied voltages.

The dielectric strength of a material can also be affected by many external factors including: insulator thickness, area of the contact surfaces, temperature, humidity, mechanical stress applied to the insulator, the presence of partial discharge, etc. Contact Chomerics Applications Engineering for details of test methods and assistance with the electrical requirements of your specific application.

CHEMICAL & SOLVENT RESISTANCE

Exposure to petrochemicals or chlorinated solvents, such as trichlorethylene, freon, toluene, trichlorethane and other cleaning agents, chemicals and solvents used in vapor degreasing, defluxing and cleaning operations is not harmful to CHO-THERM 1678 material although exposed edges do tend to swell. The amount of swelling is a function of exposure time and type of solvent. After drying out, the exposed edges will return to their former size and condition with no effect on thermal or electrical properties.

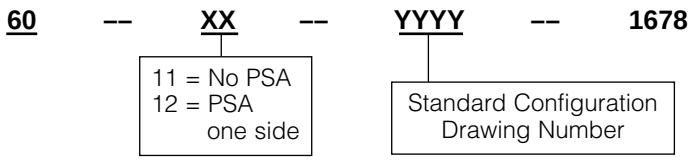
ORDERING INFORMATION

Using the diagram below, construct the appropriate part number: WW-XX-YYYY-1678. Part numbers for non-standard configurations will be assigned by Chomerics.

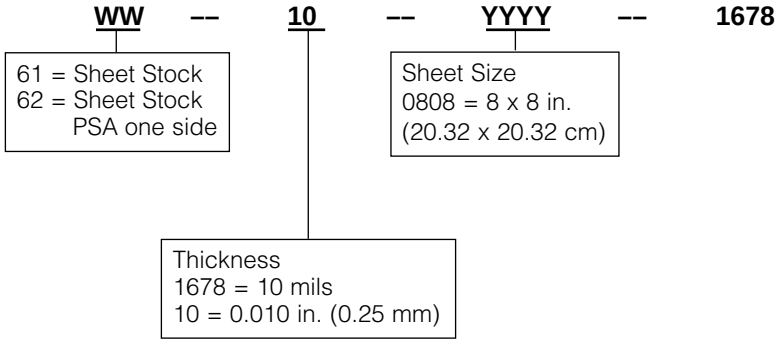
For customized die-cut parts, submit a detailed drawing of the desired part, including all dimensions, tolerances, hole locations and profile. When specifying pressure-sensitive adhesive (PSA) on non-symmetrical die-cut parts, indicate to which side PSA is to be applied.

All CHO-THERM products are available through local Chomerics distributors. Contact Chomerics for the distributor in your area.

Standard Die-Cut Parts



Standard Sheet Stock



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